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ABSTRACT

This paper discusses the design of a physical education curriculum to be used in advanced secondary physical education programs and in university basic instructional programs; the design is based on the premise of mastery learning and employs programed instructional techniques. The effective implementation of a mastery learning model necessitates changes in traditional developmental procedures, instructional strategies, and curriculum design. Changes in developmental procedures must include development of psychomotor and cognitive criterion-reference competencies for every learning unit, identification of competencies to be measured for formative and summative evaluation, design of individualized instructional materials for each learning unit consisting of a systematic and progressive series of psychomotor and cognitive tasks, and selection of psychomotor and cognitive tests for pre-entry assessment, formative evaluation, and summative evaluation. Changes in instructional strategies and curriculum design primarily involve providing thorough orientation for students and instructors, setting objectives, and evaluating the system. The number and types of activities, the proficiency levels, and the evaluation procedures are determined by the philosophy and objectives of a school and department. (Included are two program designs which would permit the implementation of mastery learning instructional strategies.) (DMT)

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MASTERY LEARNING IN PHYSICAL EDUCATION

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INTRODUCTION

Learning for mastery is not a new educational concept. Its impact upon the educational scene was in the early twenties by two approaches, one developed by Washburne (1922) and another by Morrison (1926). Similar concepts and principles were proposed by both approaches. Mastery levels of learning were defined in terms of specific educational objectives to be achieved by the student. The time variable for learning was manipulated in order to permit individual rates of learning. Systematic and progressive instructional units were designed. Students were required to achieve mastery of a designated learning level before preceeding to the next level. Diagnostic feedback was provided to the student during the learning stages and at the completion of a learning unit. And alternative instructional correctives were used to aid those students having difficulty in achieving by the original instruction.

These two early approaches to learning for mastery embodied many of the basic concepts underlying contemporary teaching strategies. However, they were not widely accepted or adopted primarly due to the lack of availability of instructional technology needed for effective implementation.

An alternative teaching strategy was introduced by the development of programed instructional techniques. The basic tenents underlying programed instruction were that complex learning tasks were structured into simple progressive sub-tasks that would be presented to the student either by

SP010 036

a teaching machine (Skinner, 1954) or programed text materials (Glaser, 1967). The student in responding to a sub-task would receive immediate feedback either by being rewarded for a correct response or corrective instruction for an incorrect response.

A more recent corollary of programed instruction is the Plato System (Programed Logic For Automatic Teaching Operation). Plato is a computer-based teaching system which provides teacher-designed instructional material to the student via a computer which monitors and evaluates the student's responses. Presently, Plato lessons for physical education are being designed (Fry 1975).

However, these approaches to new and better instructional strategies have not gained wide acceptance in physical education. This may be due, in part, to the lack of availability of conclusive research evidence that these approaches are better than traditional instructional forms, limited availability and access to instructional materials and equipment; and, the fear of them as threatening forces to already established teaching behaviors.

An instructional model formulated by Carroll (1963) seems to be more applicable to physical education instruction for minimizing individual differences in achievement. His conceptual model of school learning was based on the following variables:

1. That all students may achieve mastery of a learning task if given a sufficient amount of time.
2. That all students may not achieve mastery from one method or one type of instructional materials, there-

2. continued:

fore each student may need a different type, amount, and quality of instruction.

Bloom and his associates (1968) investigated Carroll's conceptual variables for the purpose of transforming them into a mastery learning working model. They initially defined mastery in terms of predetermined objectives to be achieved by a student upon the completion of an instructional sequence. Their next step were to devise feasible operating procedures for manipulation of the time variable that would permit individual learning rates; and to incorporate teacher/student feedback techniques for determining the quality of instruction and the ability of the student to understand the instruction.

Specifically, their working model of mastery learning consisted of the following operating procedures:

1. Segmenting the total subject matter into smaller learning units or tasks.
2. Specifying the objectives to be achieved for mastery at each learning level.
3. Providing immediate feedback corrections (formative evaluation) to the student.
4. Supplementing the initial instruction for a student having difficulty in achieving by additional or alternative instructional correctives.
5. Ensuring that a student achieves mastery of a specific

5. continued:

objective before proceding to the next level.

6. Setting an absolute performance standard for summative evaluation.

Research evidence related to the effectiveness of mastery learning strategies is still somewhat limited. However, the available results indicates a fresh and exciting approach for physical education instruction.

Utilizing concepts from Carroll's conceptual model of school learning, and from Bloom's working model of mastery learning, the author formulated a curricular and instructional mastery learning model for secondary, college, and university basic instructional programs in physical education.

Physical Education Mastery Learning Model

The effective implementation of a mastery learning model necessitates changes in traditional developmental procedures, operational environmental procedures, instructional strategies, and curriculum design. These changes are:

A. Developmental Procedures

1. Develop psychomotor and cognitive criterion-reference competencies for every learning unit.
2. Identify the competencies to be measured for formative and summative evaluation.
3. Design individualized instructional materials (Annarino, 1973, 1974) for each of the learning units consisting of a systematic and progressive series of psychomotor tasks (closed through open), and cognitive tasks requiring written, verbal, and motor responses by the student.

A. 4. Select or construct psychomotor and cognitive tests for pre-entry assessment, formative evaluation, and summative evaluation.

B. Operational Environmental Procedures

1. Modify the physical education facilities to include:

a. Multiple indoor and outdoor skill practice areas

b. Film viewing areas

c. Listening areas

d. Reading areas

e. Testing areas

f. Interview areas

2. Secure the following soft ware and hard-hardware:

a. A sufficient amount of sports equipment

b. Activity teaching films and slides

c. Activity listening tapes

d. Film and slide projectors

e. Cassette recorders

f. Video camera, recorder, playback unit, and monitors

g. Charts, posters, and diagrams

h. Reading resource materials

C. Instructional Strategy

1. A thorough orientation as to the nature and type of program is given to all students enrolled in a class section.

2. The student selects an activity unit (e.g. golf, tennis, etc.) and an Individualized Instructional Packet for that activity.

C. 3. Specific activity instructional and learning procedures are described by each instructor.

4. The student may use the diagnostic psychomotor and cognitive tests or through a personal interview to determine a starting level of competency.

5. The student achieves the prescribed psychomotor and learning tasks by using the available media, resource material, instructor assistance, and individual or group practice. The instructor is always available at the practice area for assistance and formative evaluation.

6. When a student completes the required minimal tasks in a lesson, the instructor formatively evaluates the student on a predetermined minimal competency level for that lesson.

7. A student who achieves mastery of the minimal tasks proceeds to the next lesson. If the student does not achieve mastery, the instructor diagnoses the problem and provides instructional correctives. Alternatives to the original mode of instruction are used. (e.g. If the original demonstration was by a loop film, the instructor could use as alternatives a live model demonstration or a video tape replay).

8. After a student achieves mastery of all the minimal psychomotor and cognitive competencies for the learning activity, final (summative) psychomotor and cognitive tests are administered.

9. Psychomotor and cognitive grades for the activity are determined by the student's performance on the summative evaluation that is based on predetermined standards for mastery.

C. 10. The results of summative evaluations may be also used to determine whether the student may elect to achieve a higher mastery level for the activity, select another activity or remain in the activity to achieve the minimal mastery standard.

11. If a new activity is selected, the student is assigned to the new activity area and instructor. The same procedures as outlined are followed.

D. Curriculum Design

In designing a mastery learning physical education curiculum for secondary, college, and university basic instructional programs, the following guidelines were formulated:

1. Instruction should be the primary objective with the emphasis on Lifetime Activities.
2. There should be maximum utilization of instructional staff and resources.
3. The teaching/learning environment should be structured but within the structure permit freedom of choice by the student.
4. The design should permit manipulation of the time variable for learning an activity so that a student not only regulates and controls individual rate of learning but also the amount.
5. A team teaching approach should be utilized with instructors who are highly proficient in the designated activities, individualized methodology, and the use of formative evaluation techniques.
6. Activities should be selected based upon their feasability for co ed instruction.
7. The designs should include time modules for program orientation;

D. 7. continued:

activity selection; and, physical fitness testing, evaluation, and individualized fitness prescriptions.

8. The designs can be modified as to the number and type of activity options based upon class enrollment and the availability of instructional personnel and resources.

9. The Cadet teaching option may not be offered at the college or university level if physical education majors/minors are not enrolled in the basic instructional program.

10. The time modules for the aquatic options should be determined by the American Red Cross certification requirements.

These guidelines were used for designing two physical education curriculums (see Designs A and B) that would permit the implementation of mastery learning instructional strategies. The basic difference between the two designs is an expansion of the time modules for learning in Design A.

RECOMMENDATIONS

It is recommended that these Designs and instructional strategies be used for an advanced secondary physical education program and for college and university basic instructional programs.

It is further recommended that this Mastery Learning Model (Design B) be used as another approach for implementing competency-based or performance-based professional preparation program. One of the major problems in physical education teacher preparation programs is the minimal amount of qualitative and quanititative time devoted in an overcrowded curriculum to the acquisition of sport fundamentals, knowledges, and abilities by the major student. A suggested alternative to minimizing this problem has been the

implementation of proficiency testing programs. This model, with some modifications, can be used to incorporate the basic concepts and procedures for a proficiency testing program in a professional preparation curriculum. The offering of a variety of courses, based on the model, can provide students with opportunities to demonstrate or acquire proficiences in a variety of activities. The number and types of activities, the required levels of proficiency, and the specific tests for evaluating proficiencies are determined by the philosophy and objectives of a school and department.

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PHYSICAL EDUCATION MASTERY LEARNING CURRICULUM

DESIGN A

Weeks	Option 1	Option 2	Option 3	Option 4
2	Program Orientation, Fitness Diagnostic Testing, and Prescription			
5	Golf	Tennis	Cadet Teaching	Aquatics I
5	Archery	Badminton & Handball	Cadet Teaching	Aquatics II
5	Power Volleyball	Gymnastics	Cadet Teaching	Aquatics III
1	Fitness Evaluation	Fitness Evaluation	Fitness Evaluation	Fitness Evaluation
2	Program Orientation, Fitness Diagnostic Testing, and Prescription			
5	Power Volleyball	Gymnastics	Cadet teaching	Aquatics I
5	Archery	Badminton & Handball	Cadet teaching	Aquatics II
5	Golf	Tennis	Cadet teaching	Aquatics III
1	Fitness Evaluation	Fitness Evaluation	Fitness Evaluation	Fitness Evaluation

Alternate Activities

Fencing

Angling and Casting

Dance

Bowling

Self-testing

Conditioning

Aquatic Activities

Swimmer levels

Advanced Life Saving

Water Safety Aide

Instructor: Basic swimming, Water Safety, handicapped

Scuba and Snorkeling

Small Craft

PHYSICAL EDUCATION MASTERY LEARNING CURRICULUM

DESIGN B

Weeks	Option 1	Option 2	Option 3	Option 4	Option 5
1	Program Orientation, Fitness Diagnostic Testing and Prescription				
8	Archery	Golf	Tennis	Cadet teaching	Aquatics I
8	Gymnastics	Bowling	Badminton-Handball	Cadet teaching	Aquatics II
1	Fitness Evaluation	Fitness Evaluation	Fitness Evaluation	Fitness Evaluation	Fitness Evaluation
1	Program Orientation, Fitness Diagnostic Testing and Prescription				
8	Gymnastics	Bowling	Badminton-Handball	Cadet Teaching	Aquatics I
8	Archery	Golfing	Tennis	Cadet Teaching	Aquatics II
1	Fitness Evaluation	Fitness Evaluation	Fitness Evaluation	Fitness Evaluation	Fitness Evaluation